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Jody Georgeson, editor

A Message from Our Director

Well, we have now survived several months of the pandemic. A lot of things will surely never be the same. Perhaps that's alright; maybe we needed a little shaking up.

I'm still looking for silver linings and finding them. I have been back in the office since May 20th. There aren't many people in this building, so I felt safe. Jody and I have been able to catch up on things we have wanted to do for some time now in the archives. Seattle volunteers have been busy fixing and building and accomplishing things they have wanted to do in the museum, and getting ready for tours we hope can take place soon in Seattle and Denver.

We have received some really interesting items from wonderful folks and you can read about some of them in this newsletter. You can also read our first member submission on page 7 – I hope more of you will take the time to share your memories with us and with your fellow members. We all love to read them and reminisce about our own careers!

We have had a very successful challenge grant. Thanks to all of you who were able to participate and a big thank you to our benefactor who matched your donations!

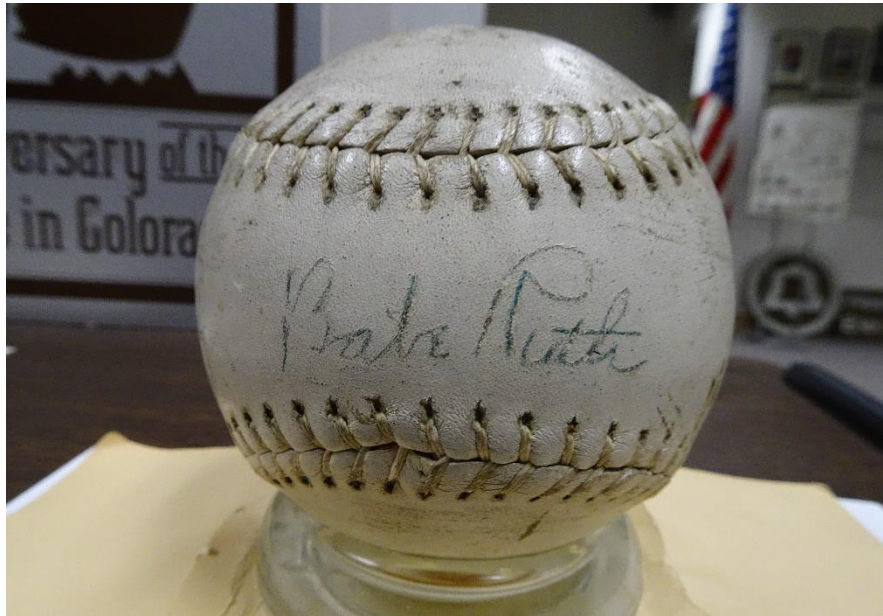


Continue to stay safe and well.

Renee Lang, Acting Executive Director

Babe Ruth Softball

by Renee Lang



Russ Cravens sent us a softball signed by the legendary Babe Ruth. The ball belonged to the Montana Pioneers since the 1960s, when Telephone Pioneers in Helena started collecting old telephone equipment and memorabilia for a museum. The small museum was on the top floor of the Mountain States Telephone and Telegraph state headquarters building at 560 N. Park. It was dismantled in the early 1990s when the phone company sold the building. The antique telephone equipment has been distributed to historical museums around the state.

Retired Montana Pioneer Frank Kamlowsky, now of Sun City, Arizona, was involved in creating the museum. He transferred to Helena in 1964 and the museum project started shortly after that. He doesn't recall exactly how the softball came into the collection but remembers that Babe Ruth visited Billings in the 1940s and attended an event at Cobb Field where the local semi-pro team played. Kamlowsky remembers that the operators on a women's softball team got Ruth's autograph on the ball.

A card attached to the base for the softball reads, "1944 BILLINGS Traffic Operators softball team had this softball autographed by the famous HOME RUN HITTER BABE RUTH when he visited BILLINGS and stayed at the NORTHERN HOTEL."

(Back in the day, Mountain Bell sponsored various employee sports teams, from baseball to basketball and bowling. We have photographs of many employee teams and one slightly sweat-stained basketball uniform in our collection.)

There is a bit of mystery about the note and the facts surrounding Ruth's visit to Billings. *The Billings Gazette* has archival stories about The Babe's visit in 1947. A more recent story notes that he signed about 500 baseballs but doesn't mention softballs. Still, the signature on the softball looks identical to those on the baseballs. The discrepancy between the date on the card and the actual visit is likely due to the years and the frailty of memories between the event and the museum getting it for display.

Inuit Phone

by Laura McGrady-Porter

We recently received an unusual telephone for the Connections Museum in Denver. Here's its story:



My father, Fred McGrady, spent his life in the career of telecommunications, both in Alaska in WWII and [later] throughout the northwest states of Washington, Oregon and California. He designed and developed telecommunication systems for whole cities. During his military career in Anchorage and throughout Alaska, he set up spy stations (Wullenwebber antennae arrays) and was a part of the Army's Secret Service intelligence against the Japanese.

While stationed in Alaska, he observed that the good Inuit peoples had no access to communications; they were being marginalized

and had no service or phone lines for telephones. There were two major reasons; one was their remoteness in the barrens and the economics of running line that far. The other was a lack of a written language and alphabet.

My father quietly tackled this problem. Fred designed a phone dial face of carved bone Alaskan animals and proceeded to educate the Inuit on how to dial a neighboring village (party line, of course) to connect to another family in a far village.

As they completely understood the iconography of Alaskan animal shapes, it was an easy identifier to learn. For a village located to the West one might dial three polar bear and two ptarmigan (66644). For the village to the east, one dialed two moose and four goose (550000).

Of all the projects my father designed, he was the most pleased and proud of this. It was fun, challenging and connecting! In 1978, he was given an award for creative forethought to connect the indigenous peoples of Alaska.



Western Electric

By John Swartly

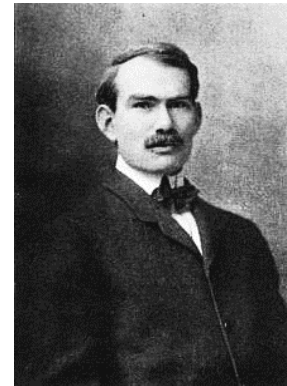
I was dusting my 219-D Western Electric vacuum tube and noticed there were 16 different patent numbers on the tube. This got my curiosity up, so I started researching each patent number. I easily found all the patents by their number. Each one had a different name as patentee. The information included a drawing and many pages of detailed information that was way over my head. As far as I could tell they all belonged to either Bell Labs or Western Electric except for two of them. I could not find a definite answer, but I believe even though different Bell Engineers create a patented item the patent belongs to Western or Bell Labs. It must take an army of patent lawyers to keep all this straight.



My vacuum tube was manufactured around 1926, it was a high-vacuum rectifier power supply transmitter tube (radio) tube. There's a good chance it was used in a similar 1000 watt #6B AM broadcast transmitter like the one in this photo. This AM broadcast transmitter is part of the awesome collection at the Telecommunications History Group-Connections Museum in Seattle. I have had the pleasure of touring this great museum. If you look hard you can see the vacuum

tubes in the right part of the unit. Since there were so many vacuum tubes that created heat, they had to cool the unit with water, note water pipes in lower right-hand corner.

Lee de Forest was an American inventor, self-described "Father of Radio," and a pioneer in the development of sound-on-film recording used for motion pictures. His most famous invention was, in 1906, an "Audion" (triode) vacuum tube, the first practical amplification device.



(Interesting research tidbit: In 1920, Alice Heacock Sedidel was the first of Western Electric's female employees to be given permission to stay on after she was married. This set a precedent in the company, which previously had not allowed married women in their employ. Miss Heacock had worked for Western Electric for sixteen years before her marriage and was the highest paid secretary in the company. In her memoirs, she wrote that the decision to stay on required a meeting of the top executives to decide whether I might remain with the company, for it established a precedent and a new policy for the company. It was not many years after their decision to allow married women to work for Bell, they started allowing maternity leaves.)

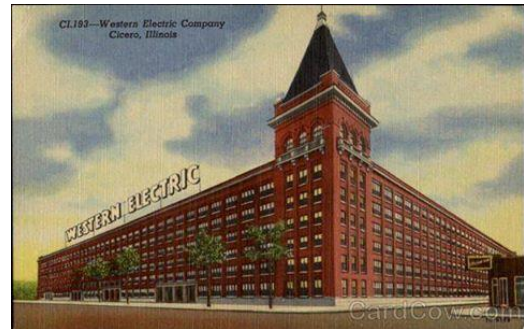
Vacuum tubes are still in demand for the very high-end audio systems; the sound quality is a lot better with a vacuum tube compared to the transistor. They still manufacture vacuum tubes in China, Russia, Czech and Slovak Republic. Since manufacturing vacuum tubes is very labor intensive, they are expensive.

There are many articles written on the question of who really the first person was to patent the working telephone, Alexander Bell, or Elisha Gray. After many court battles, the

courts decided Bell did. This decision allowed Bell to become rich and famous. What makes it more interesting, Elisha Gray and his partner, Enos Barton, were supplying telegraph equipment to the new telegraph industry. As Gray grew larger, he moved his operation from Cleveland to Chicago in 1872 and changed their name to Western Electric Manufacturing.

In 1881, American Bell Telephone Company (the company that would become AT&T,) bought Western Electric Manufacturing Co and changed their name to Western Electric Company. At this point Western Electric became Bell's manufacturing arm. In 1925 Western Electric sold off its home appliance division and spun off the power equipment division to a new company they named Graybar, in honor of the two men that started the company, Elisha Gray and Enos Barton. Western Electric only manufactured telephone equipment in the future.

In 1904, Western Electric started to build the Hawthorne Works in Cicero Illinois, making it one of the largest manufacturing plants in the world. By 1917, there were over 5,300 employees. They manufactured power apparatus and home appliances along with telephone equipment until 1925. During the 1910s, researchers at Hawthorne Works pioneered new technologies such as the high-vacuum tube, the condenser microphone and radio systems for airplanes.



In the early 1920s, Western Electric developed high-quality sound systems. At the same time the movie industry was booming, and they wanted to get past the silent movie stage. Western Electric, Bell Labs, and the Vitaphone Studio in Brooklyn N.Y. teamed up to start the "talkie," stage of the industry and formed the Vitaphone Company, which was later purchased by Warner Brothers.



With the large speaker behind the screen they tried to synchronize the sound with the movie using a record player, without much success. One of their first movies was Don Juan, released in 1926. In the early 1930s the soundtrack was photocopied to the film which made for much better quality. Western Electric played a major role in the development of movie sound systems, one reason their name was on the credits in many movies.

In 1958, Western Electric established the Engineering Research Center (ERC,) near Princeton New Jersey. Western Electric's was the first research organization solely dedicated to

the advancement of manufacturing-focused, rather than product-focused science. Here, more than 400 researchers and engineers worked to bring new manufacturing technologies into the company's production environment.

In July 1961, Western Electric announced operation of the first fully automated process ever used for making precise components. At their North Carolina Works, a 110-foot production line controlled by a single computer made, inspected, and packed deposit carbon resistors at a rate of one every three seconds. This North Carolina project was the start of automation that would change the way things were manufactured.



Western Electric's activity was divided into four different phases of its Bell System job:

1. **To manufacture telephones and apparatus.** To accomplish this, they built over 26 different plants they called Works all over the United States, each location requiring hundreds of employees to accomplish their mission. Each Works manufactured a different product.
2. **To purchase supplies required by the Bell System.** Western could buy in bulk at a much reduced price. They would purchase material needed from all over the United States from big suppliers to small businesses. These purchases would supply the distributing centers.
3. **To provide for the distribution of apparatus and supplies.** Western Electric and the operating companies built over 28 huge distributing centers located so they could supply the equipment. Not only did they have to keep a steady supply of equipment to the operating companies the distributing centers had to keep a large "disaster" inventory to meet the needs of any type of disaster that hit anywhere in the United States at any time.
4. **To install central office equipment for the Bell Telephone companies.** Western Electric also installed PBXs in large businesses.

Western Electric's demise as being part of the "world's largest monopoly," started as far back as 1974 when the Justice Department filed its first suit against the company. One of the biggest game changers was in 1977 when the Supreme Court allowed any telephone that met American National Standard Institution (ANSI) requirements could be connected to Public Telephone Network (PSTN.) War story, people would buy cheap telephones and call in a trouble report about the terrible connections. That stopped after the divestiture, AT&T would charge the customer \$45 dollars to tell them they had bought a junkie telephone. After the 1984 breakup AT&T Technologies started manufacturing telephones in other countries and buying telephone apparatus from other suppliers. They soon started closing their many Works locations and laying off hundreds of loyal employees.

Maybe the demise of Western Electric really started in 1947 when three Bell Lab employees created the transistor. The technology from that discovery has changed at "warp" speed ever since and the huge regulated monopoly Bell System could not change with it. Bell System successfully built the vast communication infrastructure we enjoy today.

Researching this newsletter has been an "eye-opener" to me on all the successful projects Western Electric was involved in. I am enormously proud of the fact I was part of the Bell System for 35 years and enjoyed going to work every day.

A Simple Story

by Roger A. Schreder

We asked our members to tell us about their telecom careers; this is the first of what I hope will be many such stories. Keep 'em coming!

This is not about a major historic event in the development of the telecommunications industry. This is just my simple story.

My interesting career with NWB began in 1957 and ended in 1988. I worked in many departments including Plant, Commercial, Marketing, and Construction; truly a fulfilling career.

One strange experience was a day in my life as an Outside Representative in the Twin Cities area (Minnesota). The task of an Outside Rep in the Commercial Department is to make in-person customer contacts as assigned by the Commercial Manager.

A majority of the contacts deal with bill collecting. In most cases, the customer's service has been disconnected for non-payment. On one occasion, I was searching for a delinquent customer in a rather "seedy" neighborhood of the Twin Cities. The customer owed several hundred dollars. It was early morning when I approached the door. I could hear music and laughter inside; likely a carryover of last night's party.

After knocking on the door, a gentleman came to greet me. I responded with the name of the customer I was looking for. He asked why I was looking for him. When I explained my purpose, the person became angry and said, "He is no longer here."

I asked, "Where is he?"

He became even more angry and said, "It is none of your business."

I knew this was going nowhere, so I thanked him and started walking to my car, which was about 20 yards away. Suddenly I heard a shot coming from the door I just left. I thought I was a dead man, but I did not dare look back. I took a deep breath, proceeded to my car and sped away. I believed I was talking to my customer and I believed his gun shot was to scare me so I would not return.

And scare me he did! I was determined I would never come back to look for that man. I put a note in the file saying "Customer has moved to Florida." This would insure I would never be dispatched on this case again.

This is my story and I am sticking to it.....Glad to be alive.....Hee Hee



The Touch-Tone™ Story from a THG Museum Perspective (part 2)

In Part 1 (*Summer 2020 issue of Connections News*), we told you about AT&T's development of Touch-Tone™ service. It's a narrative we have been working on to share with THG's museum visitors. Here we continue that story with information about what was done "behind the scenes" in central offices. Many changes and additions to central office equipment were needed before push button telephones could be installed in subscriber's homes and offices, and before the Bell System could start to earn revenue from the new service.

Central office equipment developed and deployed after 1962, including the entire ESS series, was designed to support Touch-Tone™ from the start. But the Bell System operating companies could not possibly replace their existing central office equipment all at once just to support this popular new feature, so add-on mechanisms for existing equipment had to be developed, and several examples are on display in our Seattle museum.

In central offices based on the panel system and the No. 1 crossbar, a special device called a "subscriber sender" is responsible for registering and storing the digits dialed. For these systems, subscriber sender designs were modified to include Touch-Tone™ (DTMF) receivers. To avoid modifying all the senders in an office, lines originating Touch-Tone™ traffic were initially segregated. As time went on however, many subscriber lines were connected to these updated senders even if the customer did not have a Touch-Tone™ telephone.

Because of that, it appears that some subscribers found it possible to successfully use a privately owned extension phone with buttons, even if they had not subscribed to the Touch-Tone™ service. Connecting such a phone to your line without informing the phone company was not legal. One friend of a museum volunteer tried this in the 1970s and was happily surprised to discover that it worked.

While some panel system offices were fitted with the new tone receiving senders, from records we have in the THG archives we know that none of the panel system switches in Pacific Northwest Bell territory were ever so equipped. For example, if you lived in the Rainier Valley neighborhood of Seattle, you would not have been able to get a Touch-Tone™ telephone until 1974 when the venerable panel system in that neighborhood's central office (*the machine which is now in our museum*) was finally replaced with a No. 1 ESS electronic switching system.

For offices equipped with Step-by-Step equipment, two different approaches could be used. The more complex and expensive of these was to "senderize" the office; that is, add a device similar to the No. 1 Crossbar sender which would register an entire dialed number, and then pass it along to the existing step equipment once the subscriber was finished dialing.

The Step-by-Step machine on display at the Seattle Museum came from rural Washington PNB territory and uses a simpler (and probably the more common) method. They equipped each line finder in the system with a small device known as a CONVERT-A-PAK™. This device was made by an independent equipment supplier, the Teltone Corporation, and is based on a customized 1970s era microprocessor chip from National Semiconductor. It simply receives the DTMF tones from the subscriber's telephone as they come in and immediately turns them into simulated dial pulses which are sent along to the step by step "selectors." Those selectors are then none-the-wiser about where the dial pulses are coming from.



The Teltone CONVERT-A-PAK equipment at THG's museum

One consequence of the CONVERT-A-PAK approach is that while the customer could enter the desired number more quickly on their telephone's button pad, the call did not complete any faster than the device could "dial pulse" the number onward into the Step-by-Step equipment, and this was not much faster than a human could do it with a real dial on a telephone.

Unlike our panel system, THG's No. 1 Crossbar did have new Touch-Tone™ capable senders added to it. The tone receivers for these are fully transistorized devices. But we know that some of the operating companies such as New York Telephone also used the slower but less expensive CONVERT-A-PAK™ devices with their No. 1 Crossbar systems.

No. 5 crossbar systems had a more advanced design, with "originating registers" (ORs) instead of subscriber senders. The ORs are responsible for collecting the full dialed number and then passing it on to the "brain" of the crossbar, called the marker.

THG's No. 5 Crossbar was installed on Mercer Island, Washington in 1958, and in the early 1960s was updated with a replacement OR design that could receive and process the DTMF tones directly. Some No. 5 crossbar systems had a mix of both the old and new ORs, which meant that certain subscriber lines had Touch-Tone™ service and others did not. In these offices, to add Touch-Tone™ to an existing subscriber's line their number would have to be moved to a different "vertical group" in the office, which had to be done by a central office technician working with a wire wrap tool at the "number group frame." We believe that all new No. 5 crossbar systems installed after 1962 were equipped with only the new Touch-Tone™ capable originating registers from the outset.



The transistorized DTMF decoders in the senders of the museum's No. 1 Crossbar system

These improved designs meant that at least for customers served by either type of crossbar switch, they could not only dial their calls more quickly, but the calls completed more quickly too.

The No. 1 ESS and later generation switches were computer controlled, and the computer's memory contained a "line record" for each customer's line which specified which features they were entitled to have, including Touch-Tone™ service. This made it much easier for the technicians to "provision" Touch-Tone™ for a customer with just a few keystrokes at the console, or to "de-provision" it for someone who no longer wanted to pay for it. The ability to do so became more important to the Bell System after 1978, because once the market for subscriber sets was opened up to third party competition, many telephones were sold with a simple switch that changed them from pulse dialing to DTMF.

The monthly additional charge for Touch-Tone™ service continued in most states until the 1990s, when the option was ended and Touch-Tone™ was simply made part of the monthly base rate by agreement with the Public Utilities Commissions, and as far as we know there is no phone company in the U.S. today that still offers the options of a rotary dial only line.

It was also envisioned from the start that DTMF tones could be used not just to dial telephone numbers, but to communicate with computerized information services. The earliest Touch-Tone™ telephones from Western Electric only had 10 buttons (the model 1500 for example) but those are rare and collectable today because the # and * keys were quickly added to the design, so people could respond to recorded voice saying something like "enter your account number, followed by the pound key."

It is this use of the DTMF system that causes even the most modern of smart cell phones to still have an on-screen keypad that can generate the tones. That is probably the legacy of this Bell System invention that is most familiar to our younger museum visitors today, and something the Bell System perhaps does not get enough credit for.

THG is glad to be able to share this history with our visitors who remember the transition to push button telephones as well as those who don't, and to share it with them through artifacts, some well researched storytelling, and hands on demonstrations.

This was sent to us by our good friend John Herbolich. Enjoy!

WORD SLEUTH

PRE-CELL PHONE ERA

E T I L E K A B C A Y W U R P
P N D R A O B H C T I W S U L
W H E C E I P H T U O M S J K
H A F D B Z D X K O O H F F O
H N L V T R Q Y O M B K I H O
A D E L D A R C R U F D B Z H
N C Y W P V R O T A R E P O N
D R O C T H R T Q O T N L K O
S A I H P H O N E B O O T H F
E N D C A N E N I L Y T R A P
T K Z X S W V R E V I E C E R

Find the listed words in the diagram. They run in all directions – forward, backward, up, down and diagonally. Unlisted clue hint: **The person on the switchboard.**

Bakelite
Cord
Cradle
Handcrank

Handset
Mouthpiece
Off hook
On hook

Party line
Phone booth
Push buttons
Receiver

Rotary dial
Switchboard
Wall phone



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